Improving Quality of Cancer Screening – Prime objective of CanScreen5

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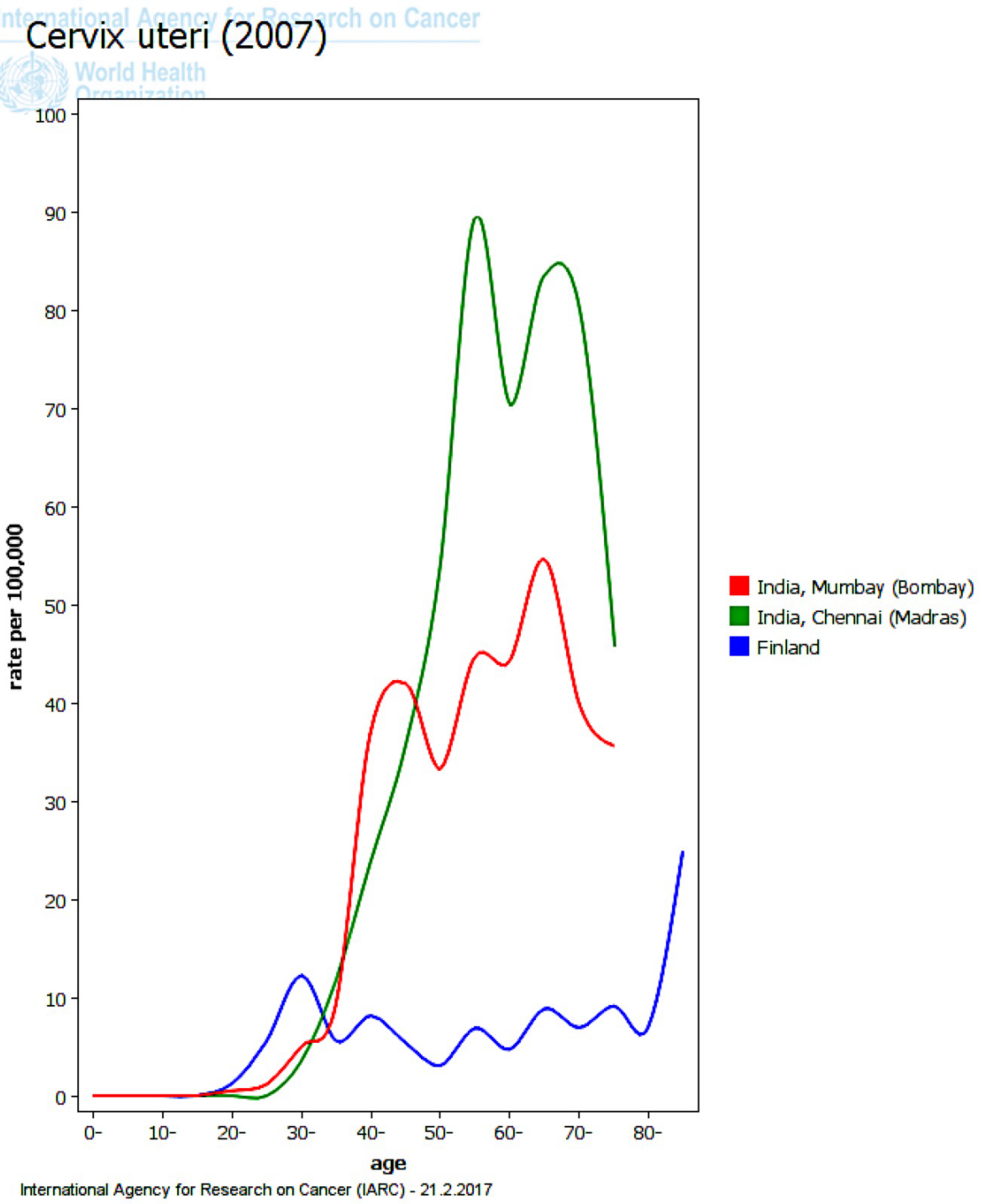
"For the screening programme to be successful, **every aspect of the programme**, from identification and invitation to management of screen positives must be **performed to the highest standard**.

Poor quality screening is ineffective and may do **more harm than good**".

Recommendations on cancer screening in the European union. Advisory Committee on Cancer Prevention. *Eur J Cancer. 2000;36:1473-8.*

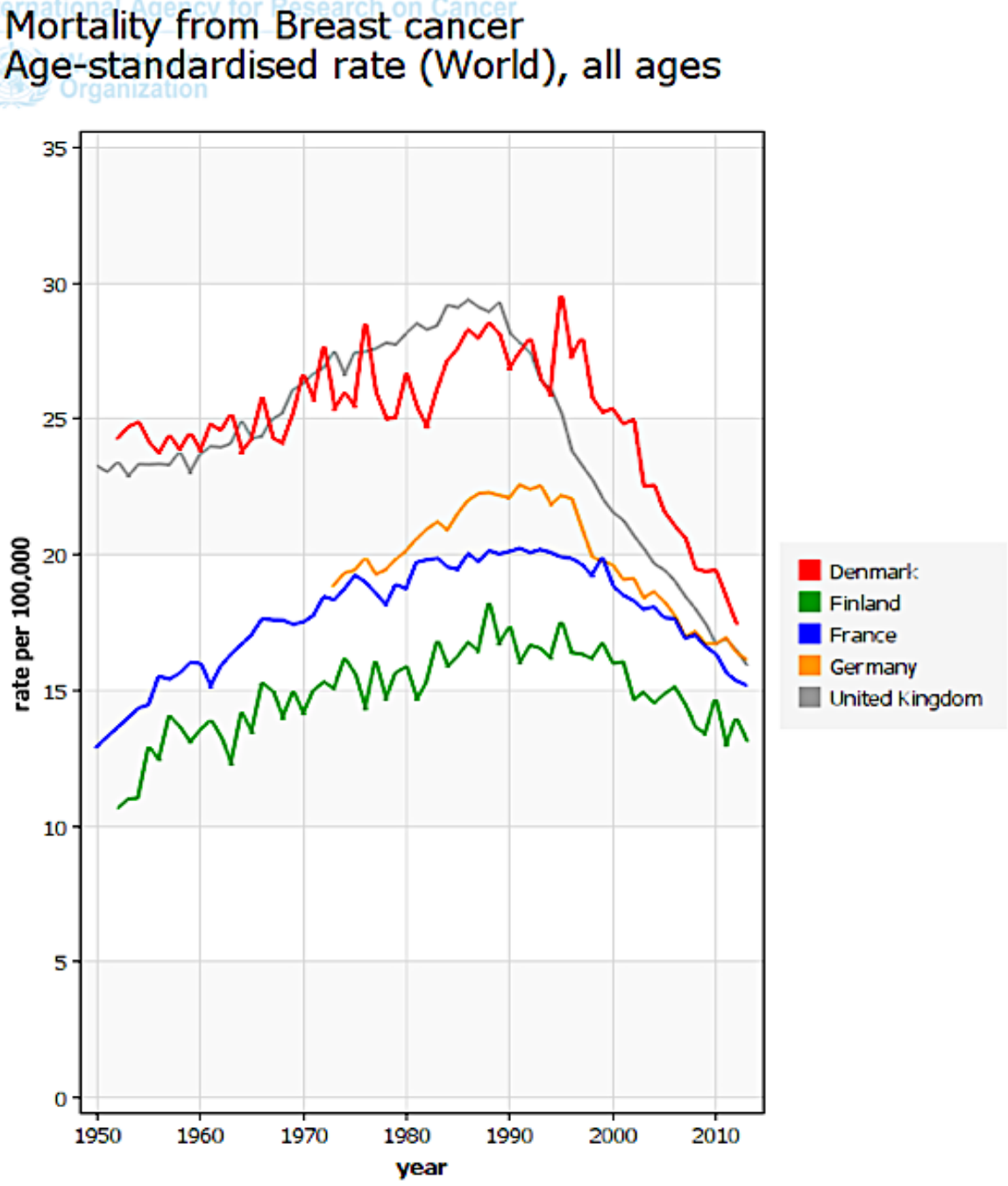
Impact of Screening on Age Specific Incidence of Cervical Cancer

India vs. Finland



Trends in Mortality from Breast Cancer

Countries with well-organized screening

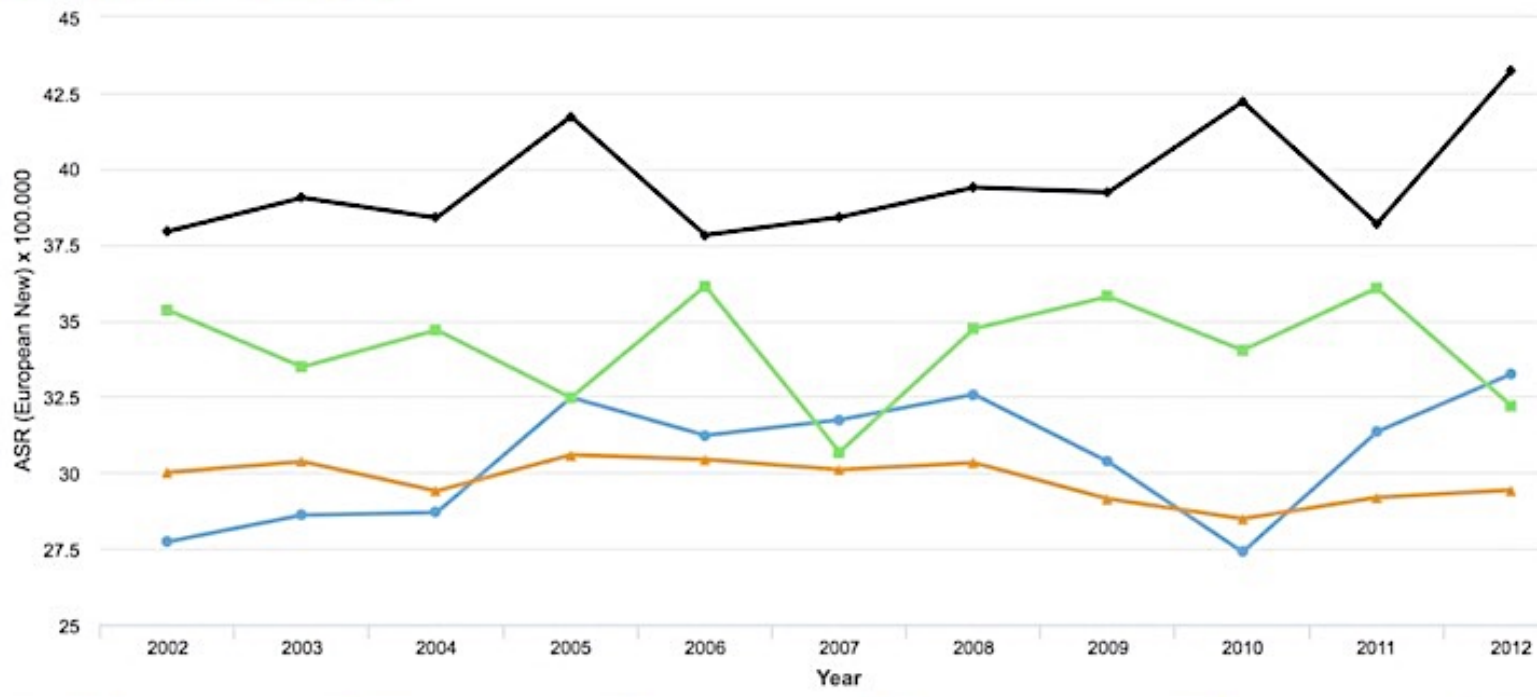


Trends in Mortality from Breast Cancer

Countries with not so well-organized screening

Mortality trends by period

registries, Female, Breast female, All ages



Indicator	Registry	Sex	Cancer	Age Group
Mortality	BG Bulgaria	Female	Breast female	0-85+
Mortality	HR Croatia	Female	Breast female	0-85+
Mortality	LV Latvia	Female	Breast female	0-85+
Mortality	PL Poland	Female	Breast female	0-85+

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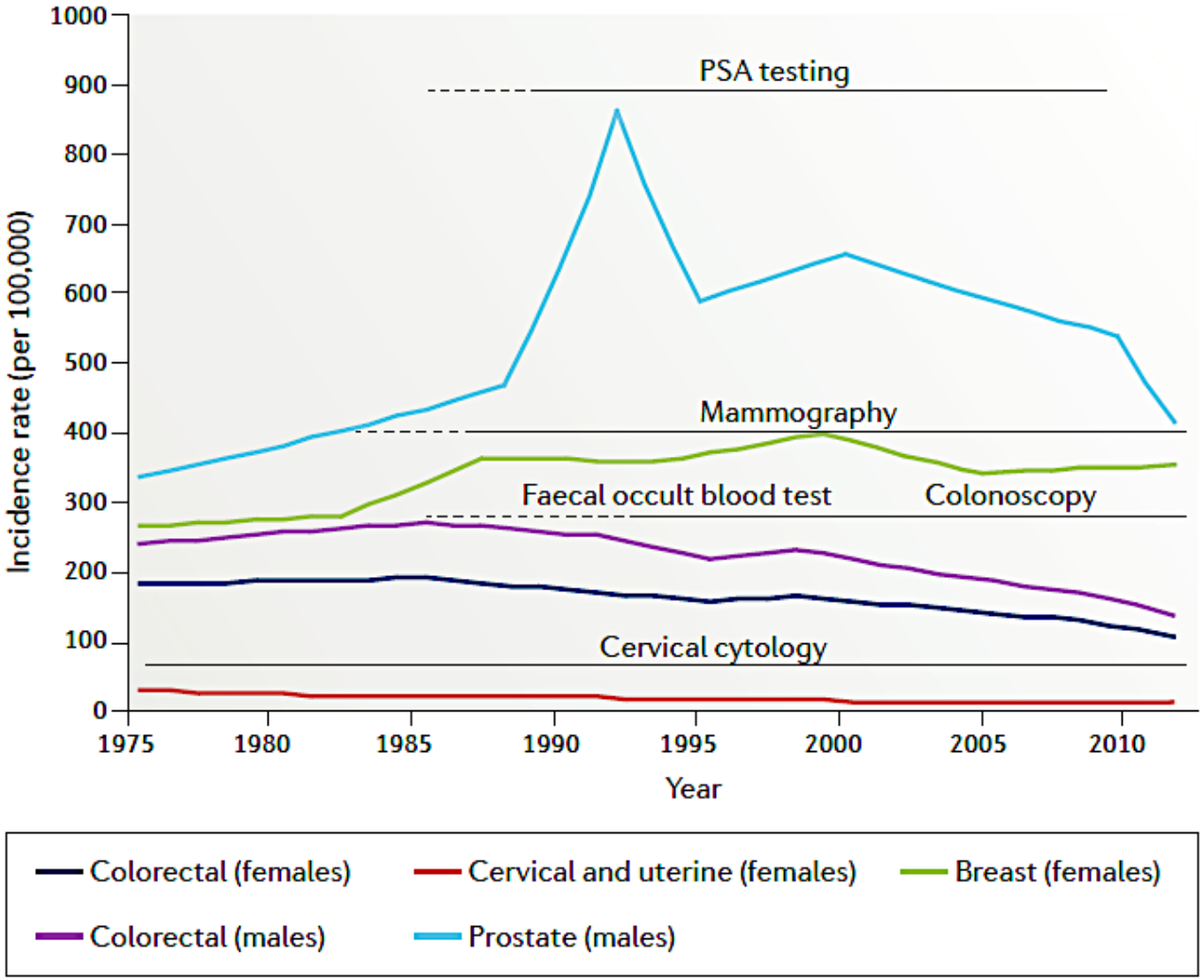
Source: European Commission Information System (ECIS)

“All screening programs do harms; some do more good than harm at reasonable cost”

Gray JA, Patnick J, Blanks RG. Maximising benefit and minimising harm of screening. *BMJ. 2008;336:480-3.*

Age-adjusted incidence rates of cancers for which population-based screening is practiced in USA



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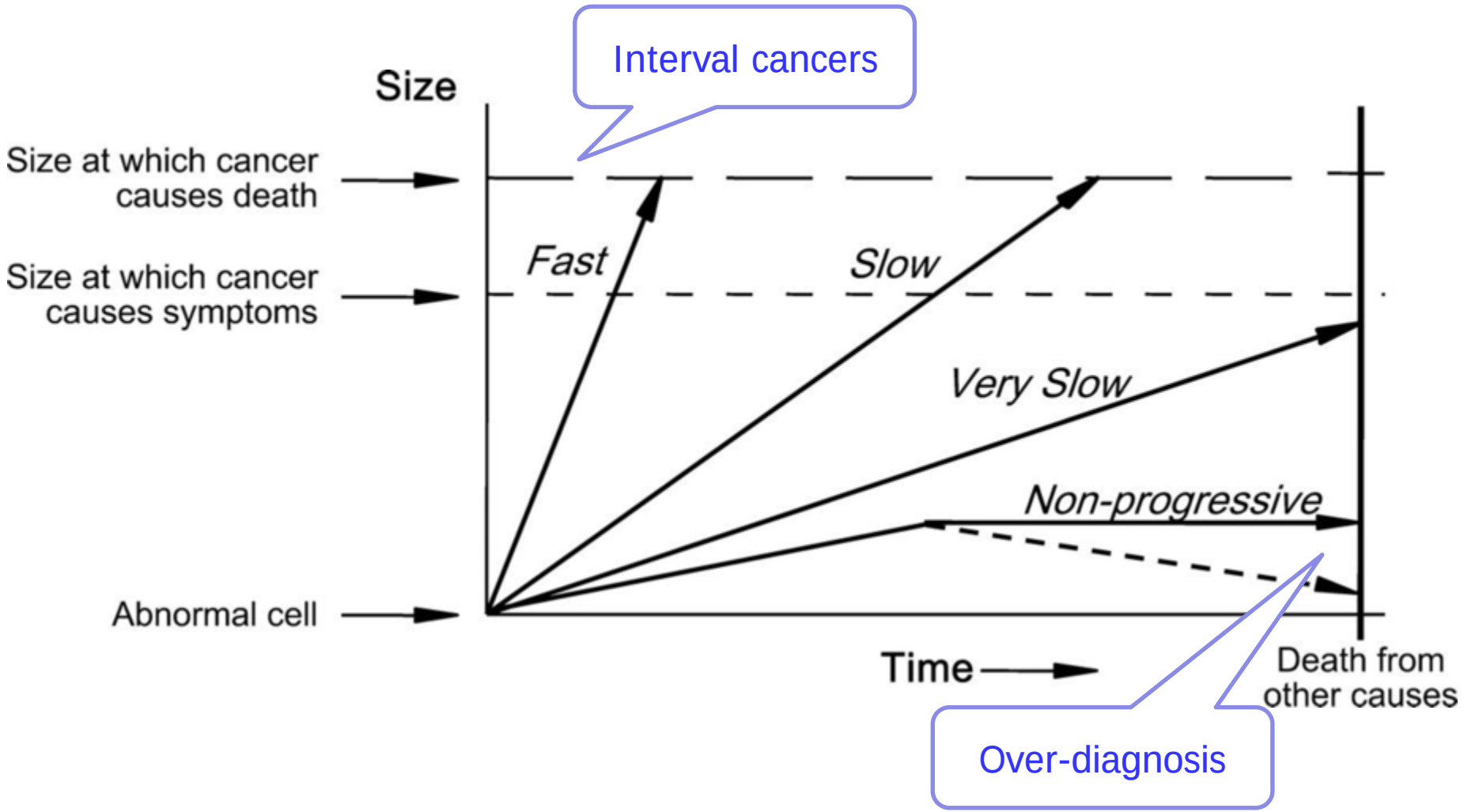
Shieh et al, Nat Rev Clin Oncol. 2016;13(9):550-65.

The Heterogeneity of Cancer Progression and Resulting Interval Cancers & Over diagnosis



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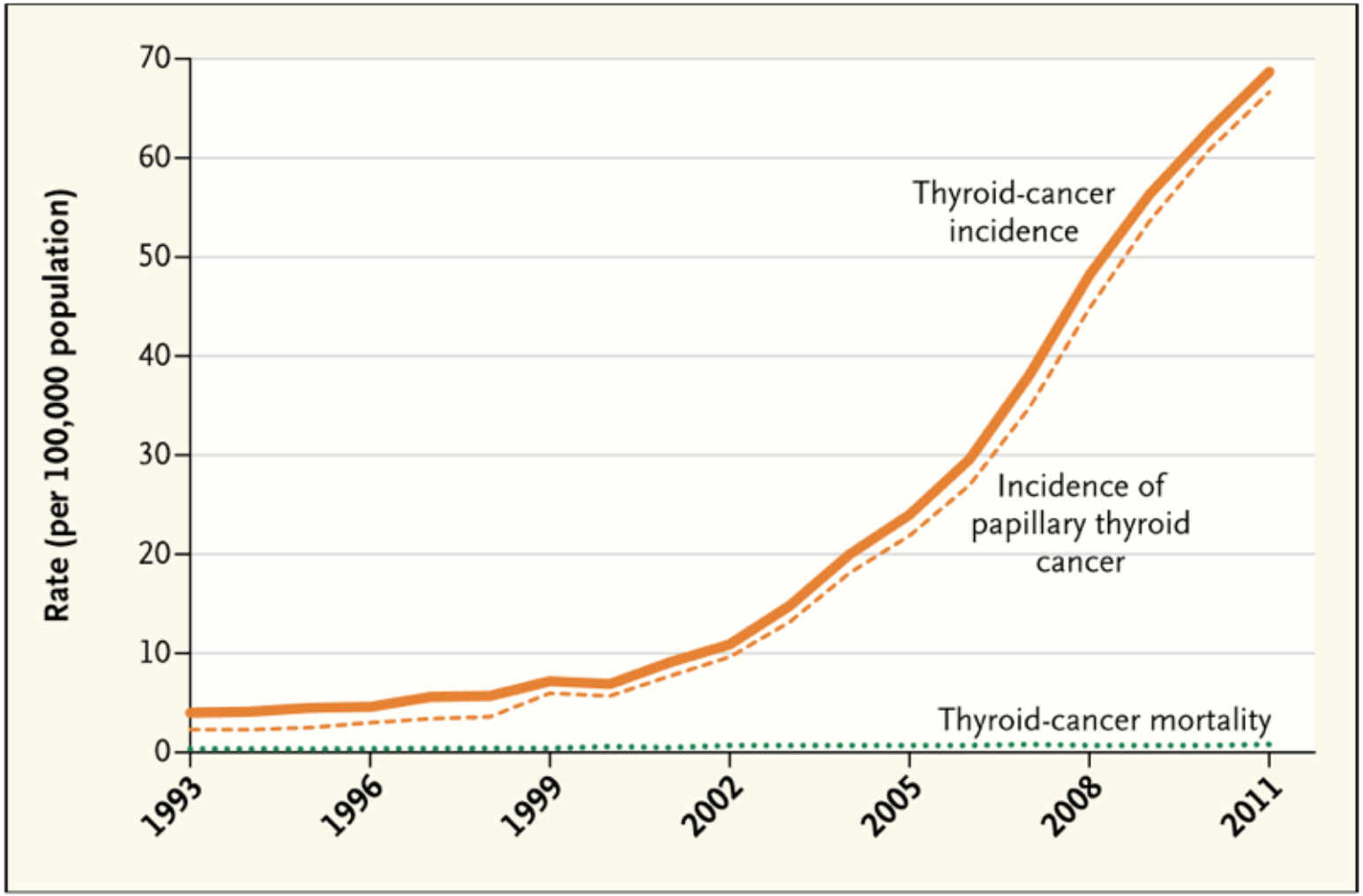
Welch HG & Black WC. J Natl Cancer Inst. 2010;102(9):605-13.

Thyroid-Cancer Incidence and Related Mortality in South Korea, 1993–2011



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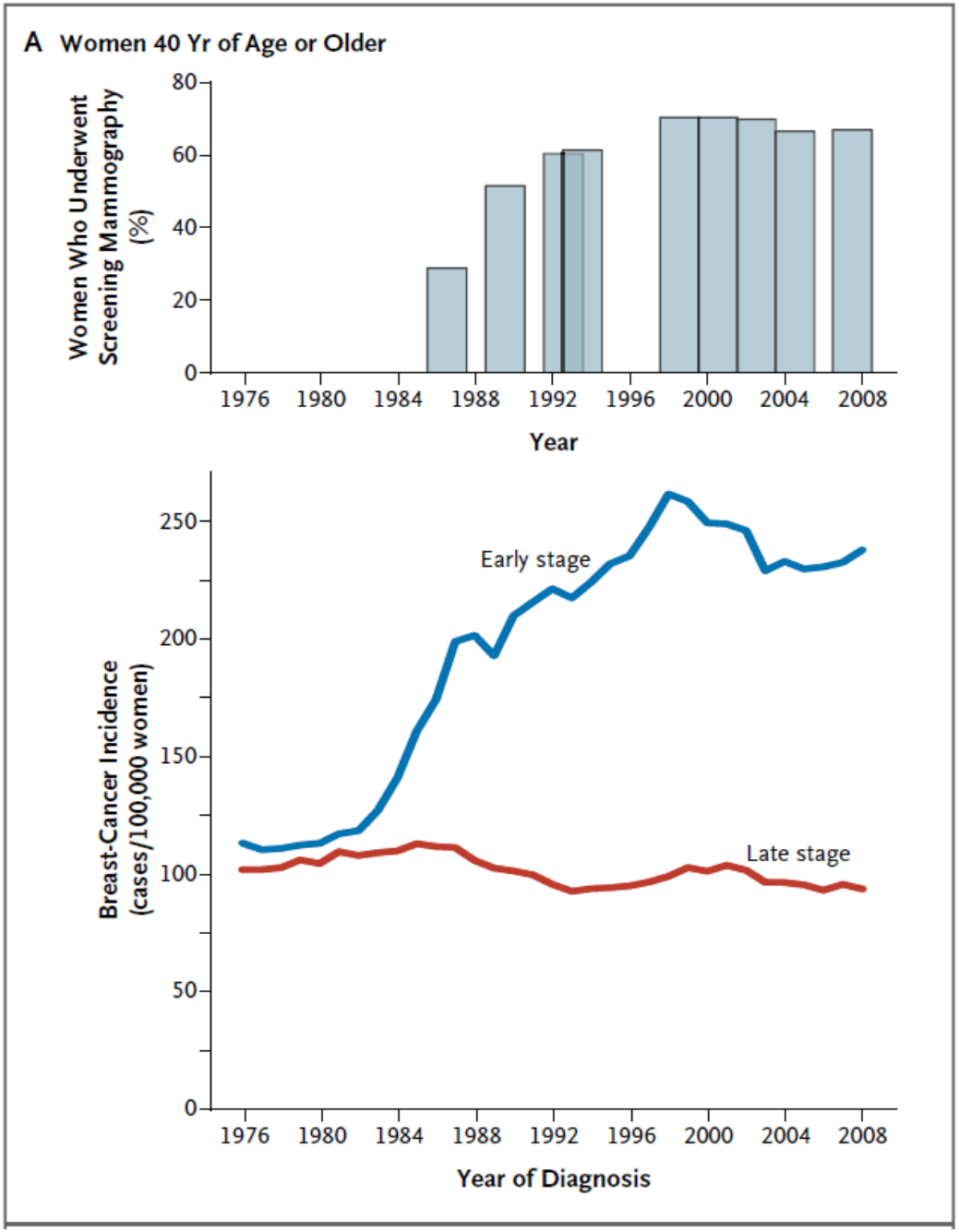
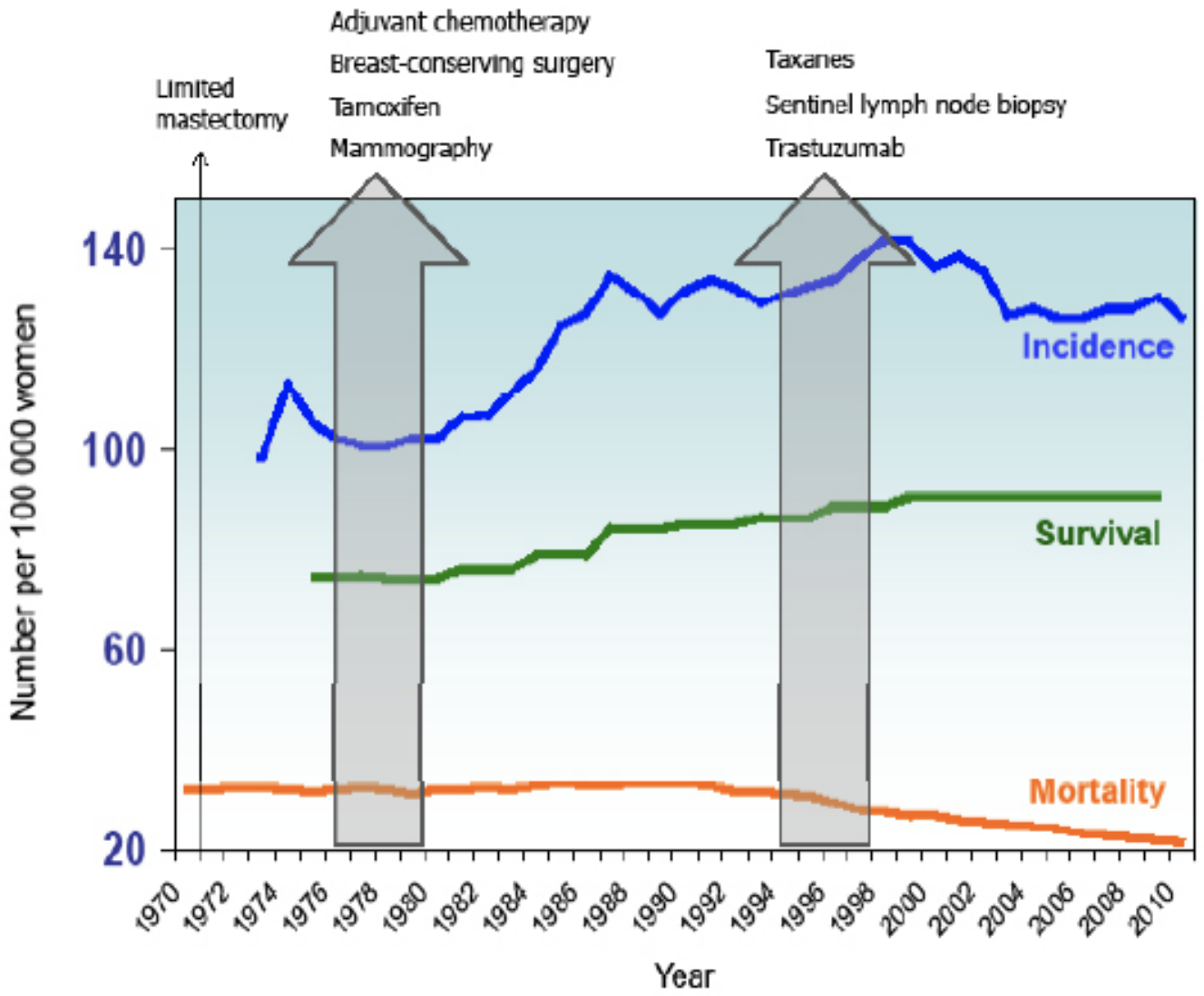
Ahn HS et al., N Engl J Med. 2014;371:1765-7.

Use of Screening Mammography and Incidence of Stage-Specific Breast Cancer in USA, 1976–2008



Bleyer A & Welch HG. N Engl J Med. 2012;367:1998-2005.

Is the Impact of Breast Cancer Screening on Mortality Over-estimated?



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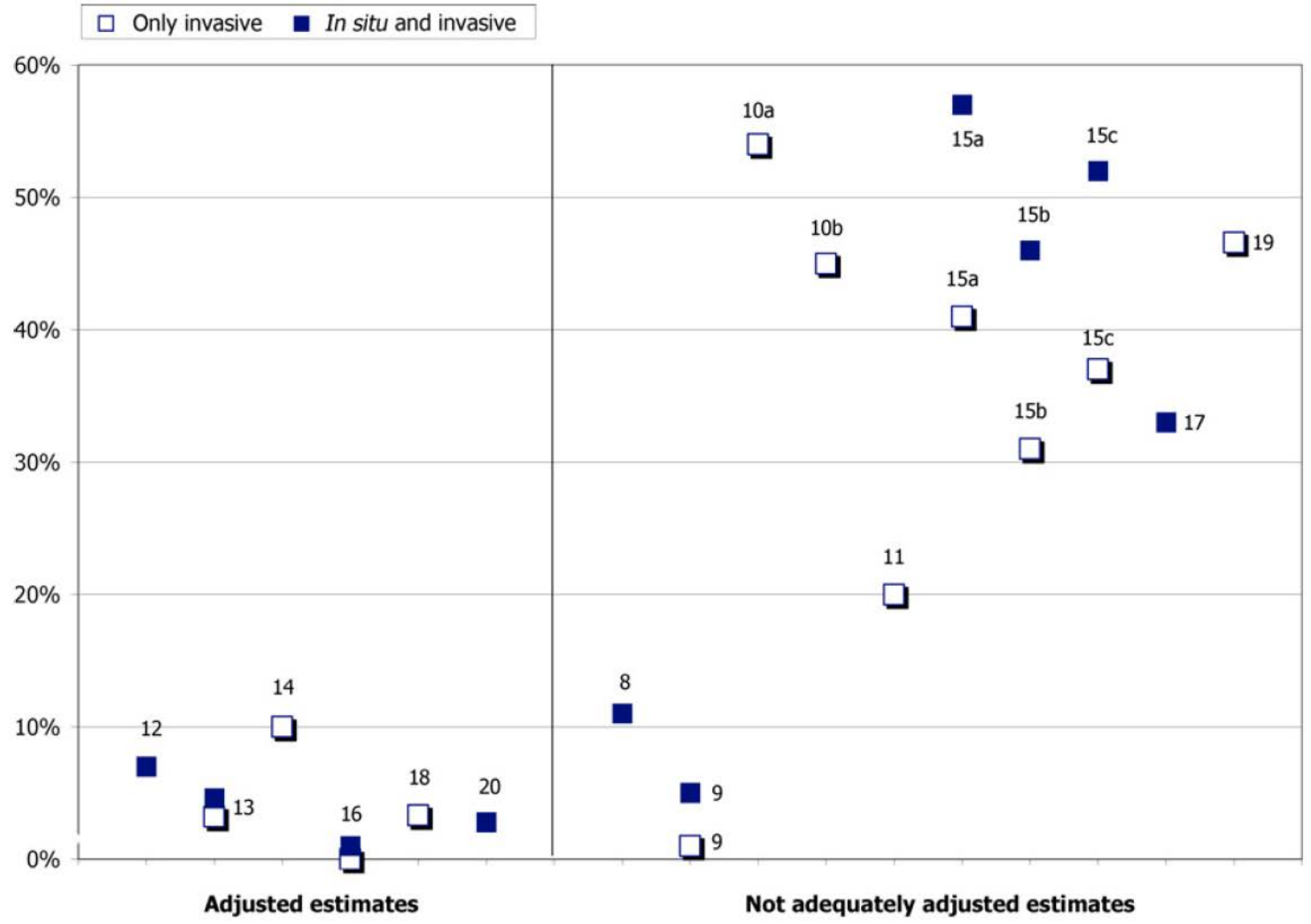
IARC Handbooks of Cancer Prevention: Breast Cancer Screening, Volume 15. IARC 2016

Estimating Overdiagnosis

- Detection of cancers at screening that wouldn't have been clinically identified in the lifetime of the person
- Estimated by comparing the cumulative incidence of breast cancers in the screened and unscreened arms several years after screening ends
- Should be adjusted for the breast cancer risk (age, obesity, HRT etc.) and effect of lead time (compensatory drop)
- Usually the lead time is 5-15 years
- Expressed as a % of expected incidence in absence of screening

Overdiagnosis estimates classified according to the presence / absence of both the adjustments



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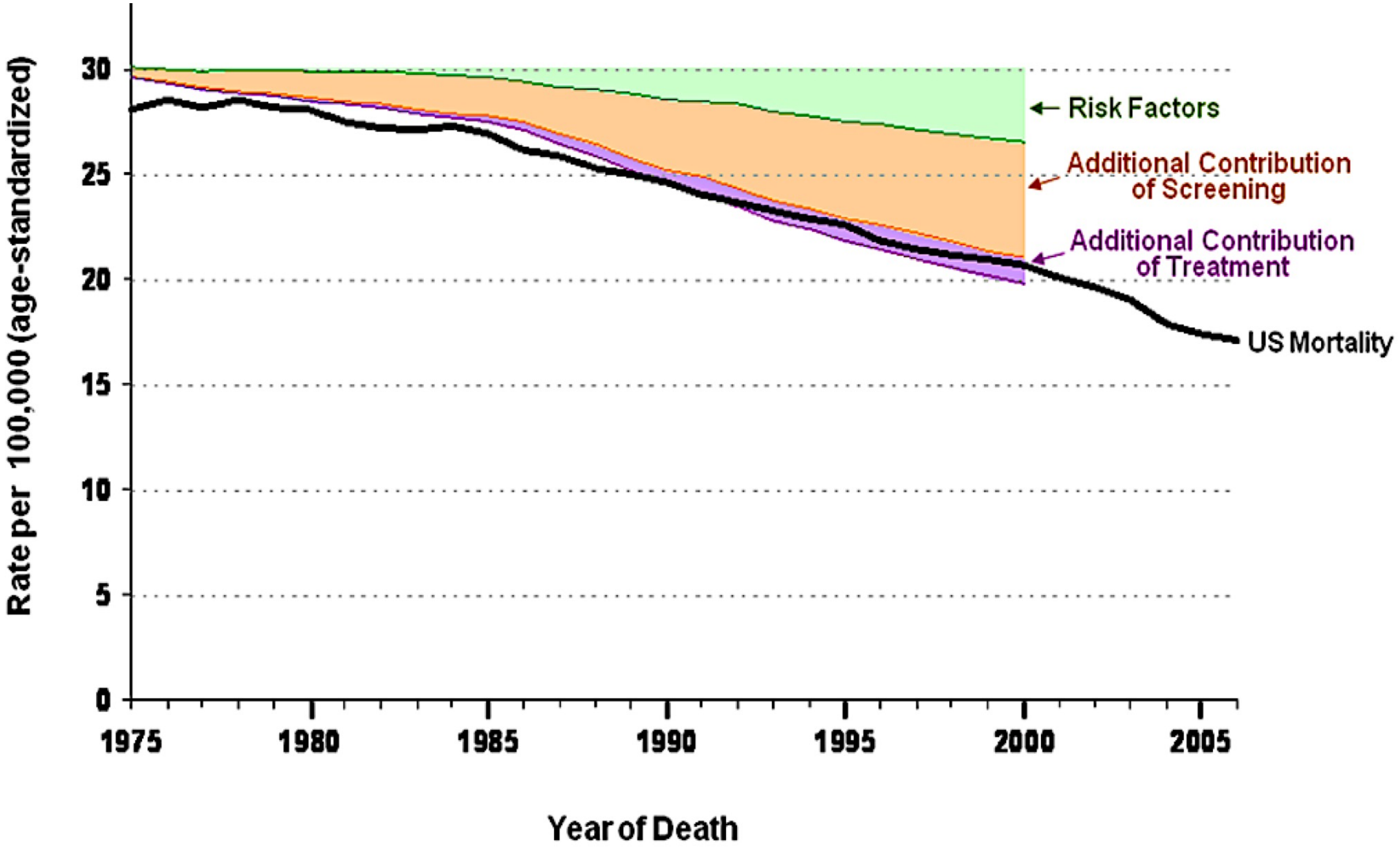
Puliti D et al. J Med Screen. 2012;19 Suppl 1:42-56.

Impact of Interventions on CRC



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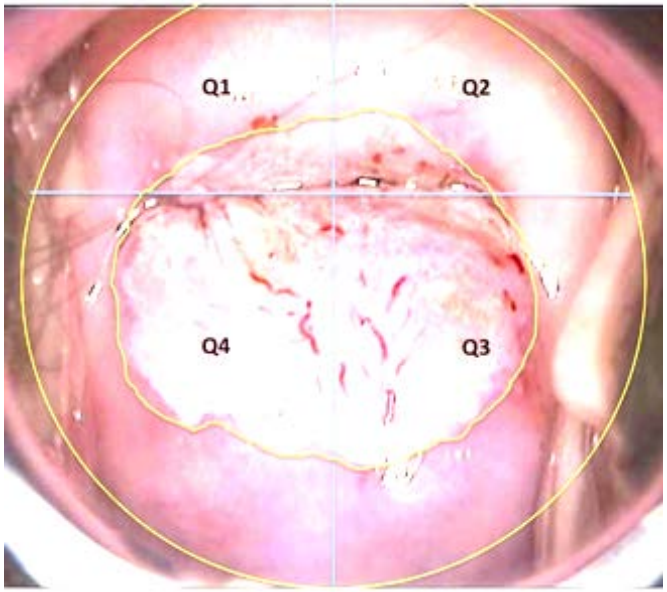
Edwards et al. Cancer. 2010;116(3):544-73.

Tailored Management Based on Disease Biology



10 year survival of 98.8% reported for women with untreated low-grade DCIS, and 98.6% for those in whom low-grade DCIS was surgically excised

Sagara Y et al. JAMA Surg. 2015;150(8):739-45.

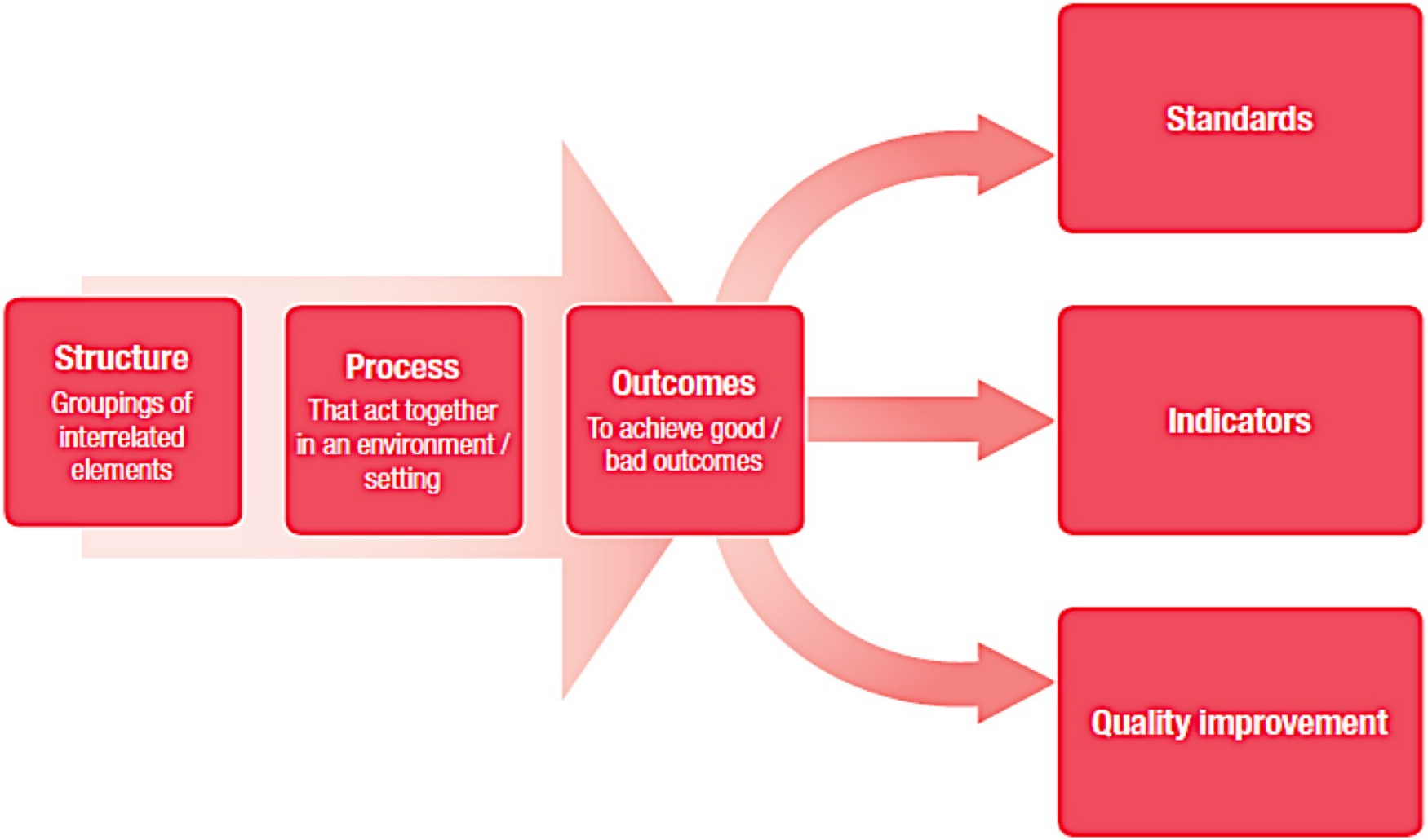
Lung Cancer Screening – saves lives but..

- Screening of the high risk population with LDCT annually reduces 16% mortality from Lung cancer
- Cumulative false +ve rate – 37%
- High level of expertise required to interpret LDCT and manage lesions may not be feasible in community practice
- USPSTF recommend screening for smokers with a 30 pack-year history of tobacco use (and a quit date within 15 years for former smokers) starting at 55+ years
- Utilize resources for primary prevention!

Dimensions of Quality

- **Equity and access** – specially for the disadvantaged population due to SE status, age, ethnicity, gender and geography
- **Minimized harm**
- **Efficiency** in resource utilization
- **Effectiveness** in achieving a measurable and expected benefit

Framework for Measuring Healthcare Quality



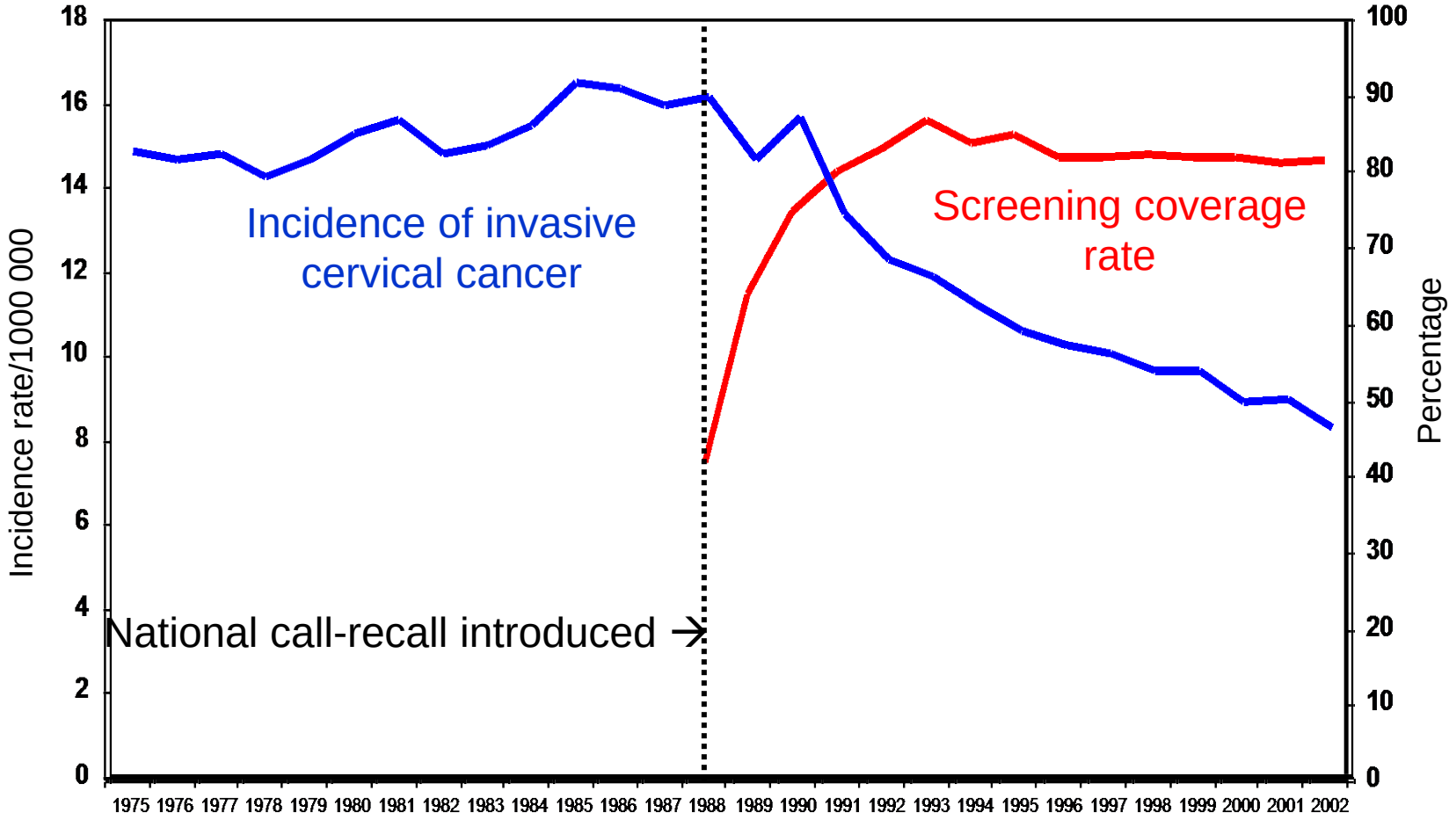
Performance of Population-based vs. 'opportunistic' breast cancer screening: a study from Denmark

- Study included 37,072 women attending population-based screening and 2855 women attending private clinics for screening
- All women followed for 2 years for breast cancer diagnosis through linkage with health registers

		Sensitivity (Age-adjusted) (95% CI)	**Specificity** (Age-adjusted) (95% CI)
Pop-based screening		**67.2%** (60.7 - 74.5)	98.4% (98.3 – 98.6)
Opportunistic screening	BIRAD 4-5	**33.6%** (19.5 - 57.8)	99.1% (98.8 – 99.5)
	BIRAD 3-5	**37.4%** (22.6 - 61.7)	97.9% (97.4 – 98.4)

Bihrmann K et al. J Med Screen. 2008;15(1):23-6.

Improvement in performance after introduction of Pop-based Screening: England, 1975-2002



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Source: Cancer Research UK; Quinn et al., 1999; Willoughby et al., 2006

2015-2017 Second report on the implementation of population cancer screening in the European Union

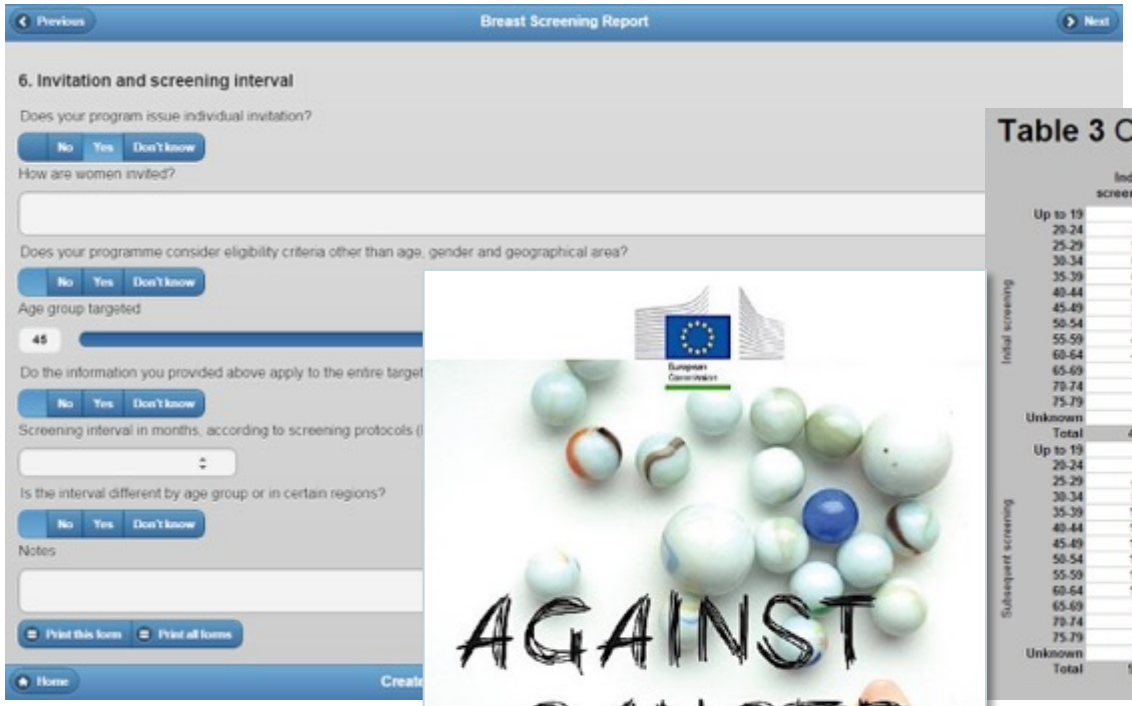

Table 3 Colposcopy referral

		Individuals screened in 2012	Referred to colposcopy	Not referred	Total	Unknown	Referred to colposcopy	Total	Referral to colposcopy rate %
Initial screening	Up to 19				0	0			
	20-24	6618	352	6266	6618	0	352	6618	5.3%
	25-29	96215	4591	91624	96215	0	4591	96215	4.8%
	30-34	60970	2590	58380	60970	0	2590	60970	4.2%
	35-39	64141	2273	61868	64141	0	2273	64141	3.5%
	40-44	61794	2073	59721	61794	0	2073	61794	3.4%
	45-49	55624	1687	53937	55624	0	1687	55624	3.0%
	50-54	52358	1421	50937	52358	0	1421	52358	2.7%
	55-59	48167	1048	47119	48167	0	1048	48167	2.2%
	60-64	40883	595	40288	40883	0	595	40883	1.5%
	65-69	2561	39	2522	2561	0	39	2561	1.5%
	70-74				0	0			
	75-79				0	0			
	Unknown	5184	442	4742	5184	0	442	5184	8.5%
	Total	494515	17111	477404	494515	0	17111	494515	3.5%
Subsequent screening	Up to 19				0	0			
	20-24	859	13	846	859	0	13	859	1.5%
	25-29	46010	1681	44329	46010	0	1681	46010	3.7%
	30-34	83138	2625	80513	83138	0	2625	83138	3.2%
	35-39	117982	3061	114921	117982	0	3061	117982	2.6%
	40-44	143633	3343	140190	143533	0	3343	143533	2.3%
	45-49	154443	3151	151292	154443	0	3151	154443	2.0%
	50-54	137730	2133	135597	137730	0	2133	137730	1.5%
	55-59	127962	1263	126699	127962	0	1263	127962	1.0%
	60-64	129111	867	128244	129111	0	867	129111	0.7%
	65-69	5073	37	5036	5073	0	37	5073	0.7%
	70-74				0	0			
	75-79				0	0			
	Unknown	11780	89	11691	11780	0	89	11780	0.8%
	Total	957621	18263	939358	957621	0	18263	957621	1.9%

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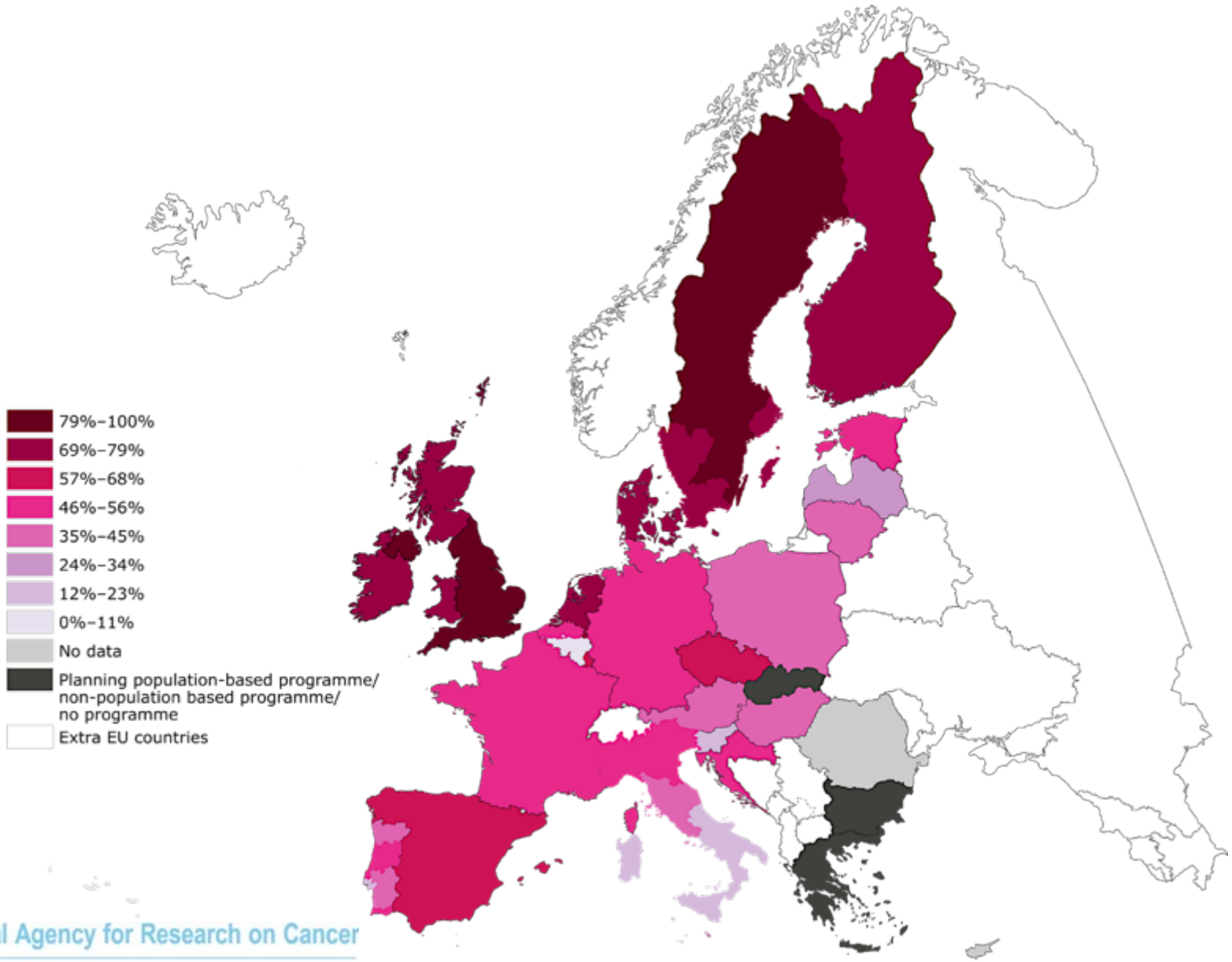
Breast Cancer Screening – Exam Coverage (50-69 years)



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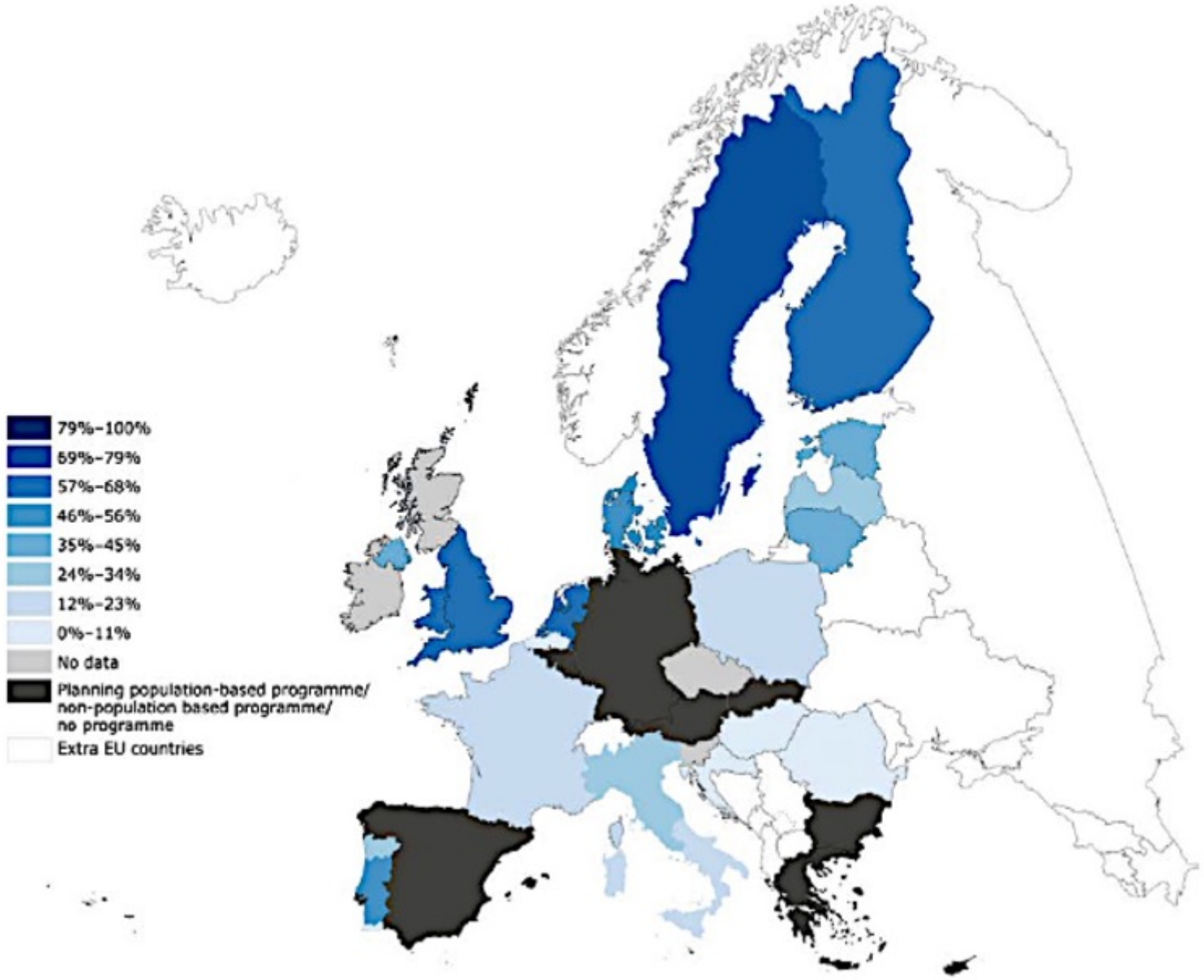
Cervical Cancer Screening – Exam Coverage by Programme-Specific Age Range



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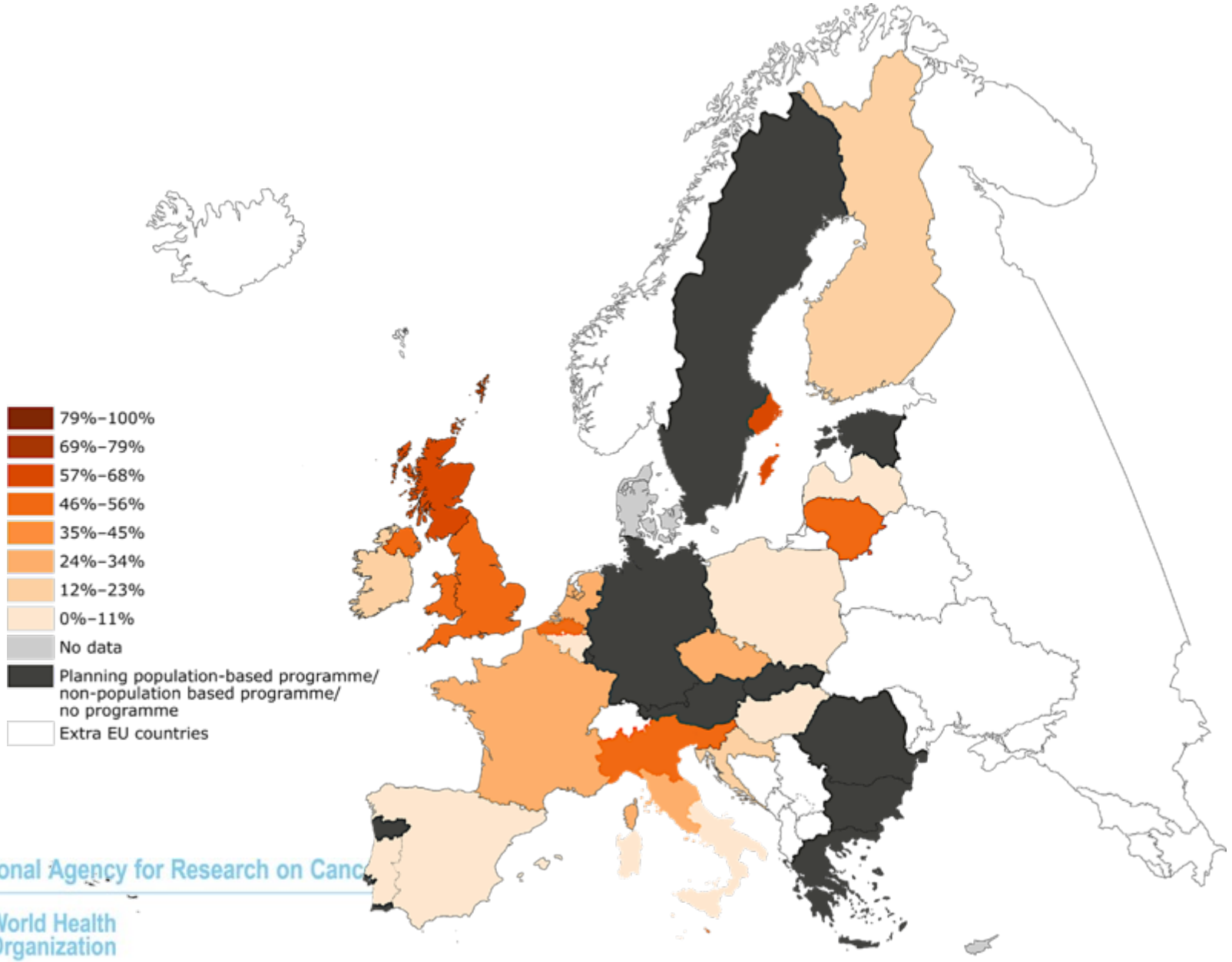
Colorectal Cancer Screening – Exam Coverage by Programme Specific Age Range



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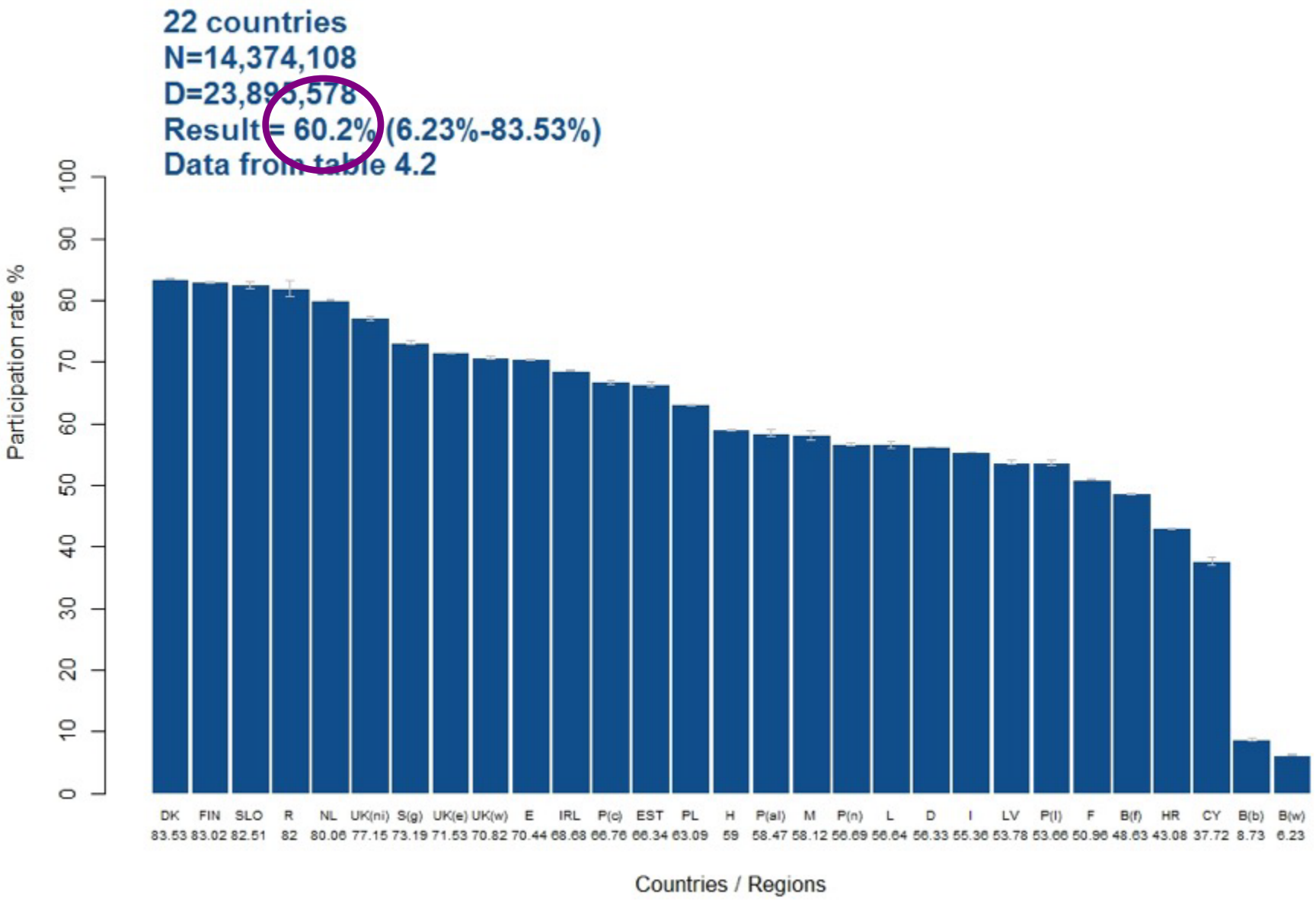
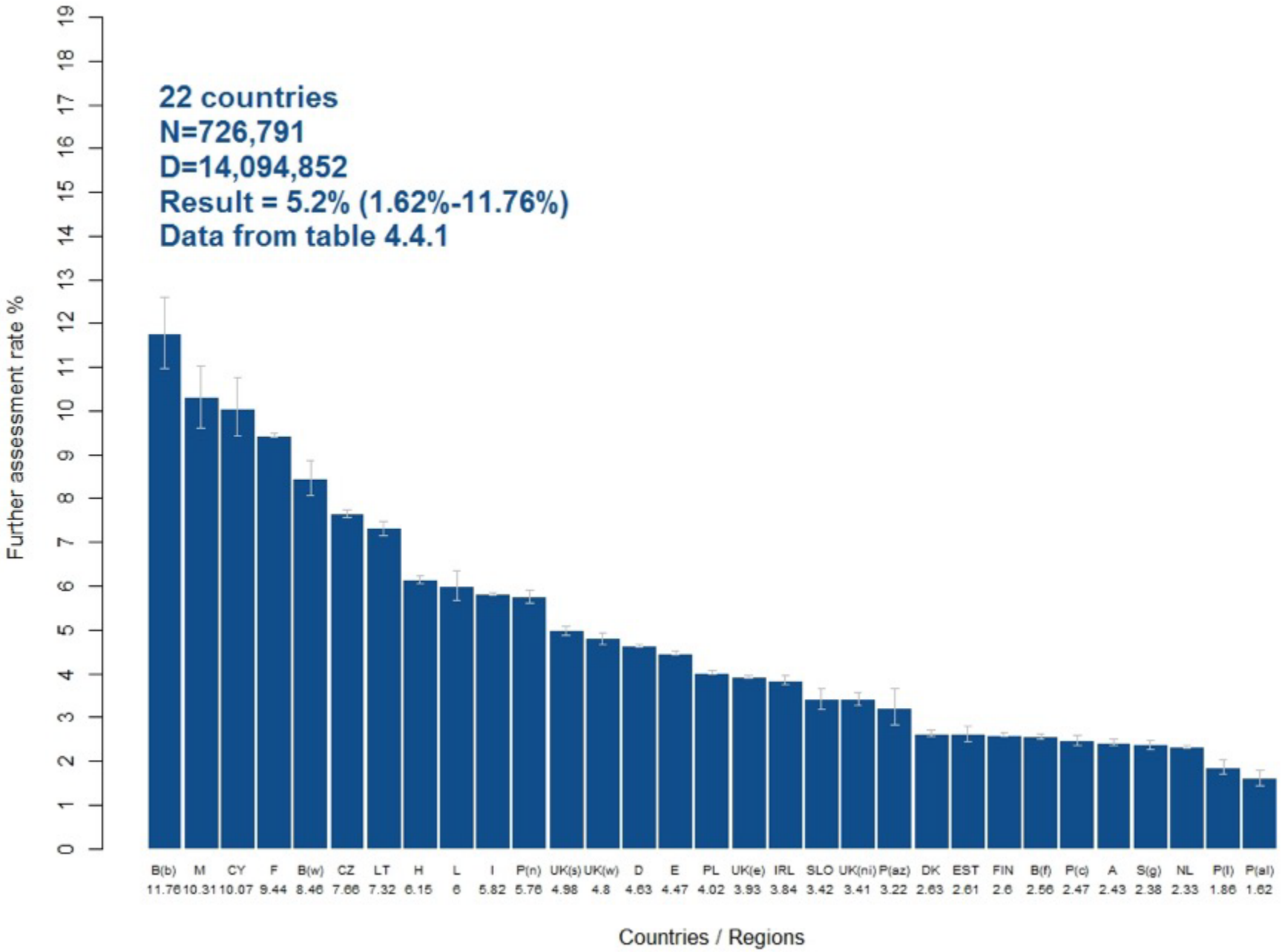
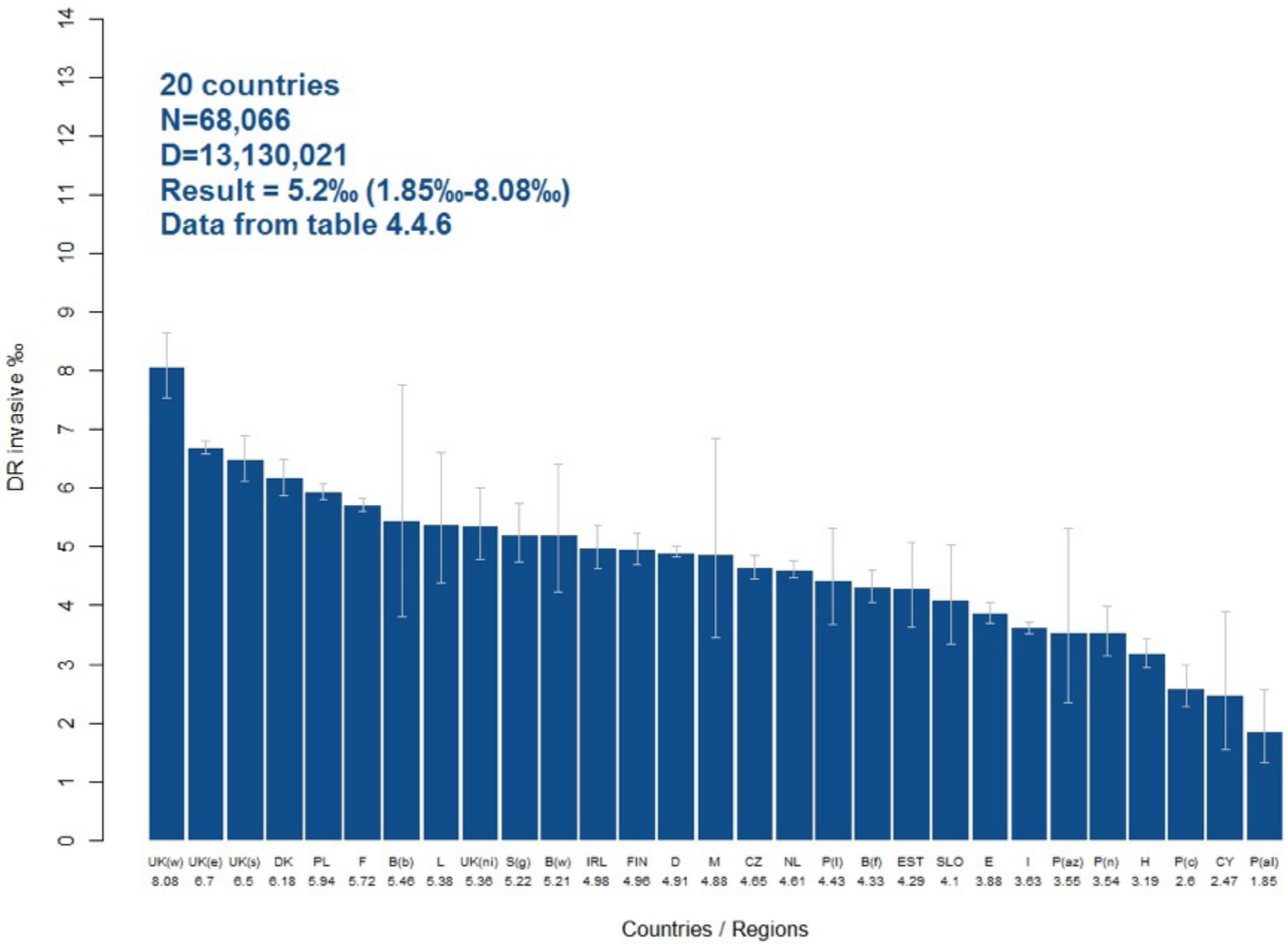
BREAST – Participation rate (Women, 50-69 years)



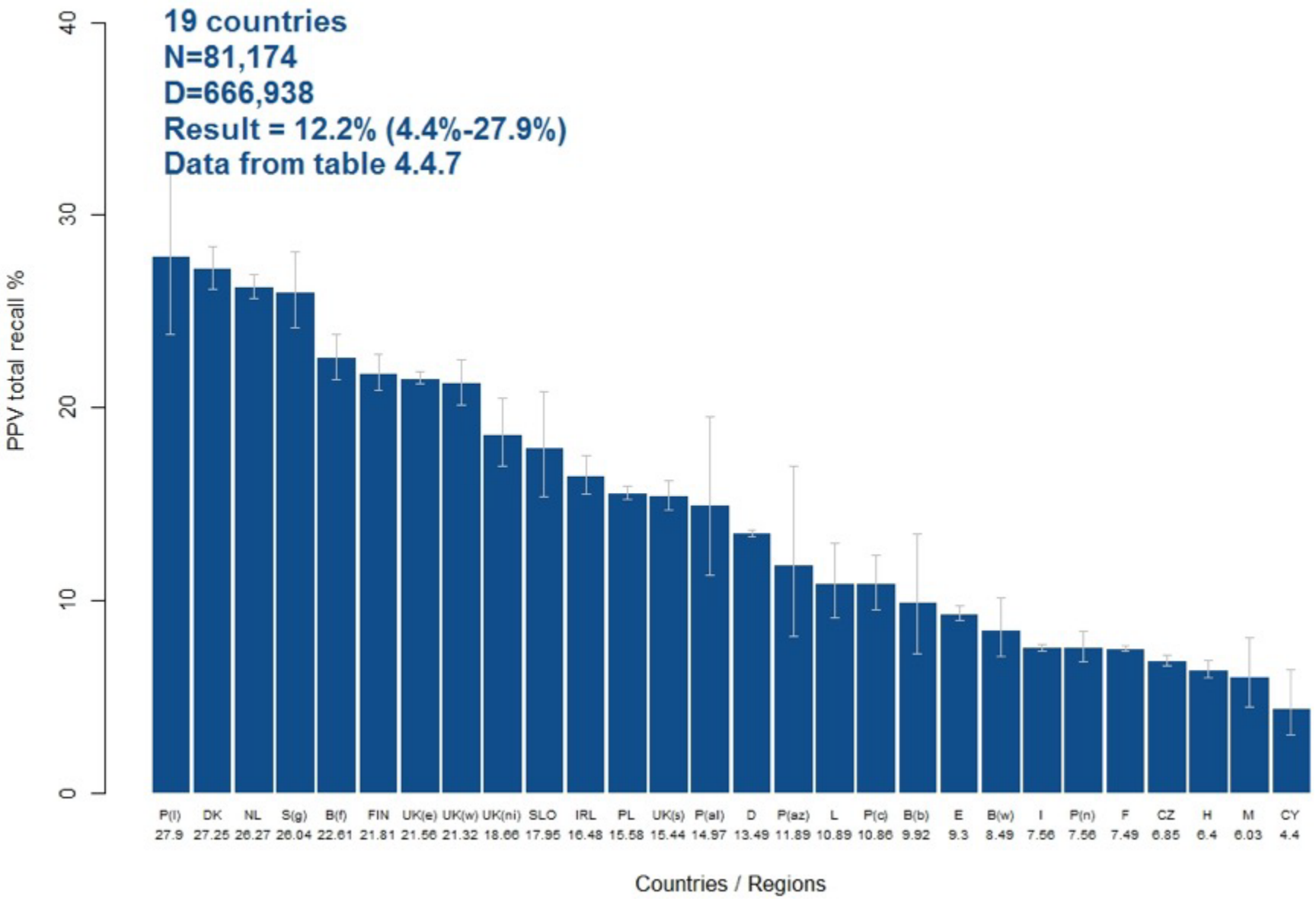
BREAST – Further assessment rate (Women, 50-69 years)



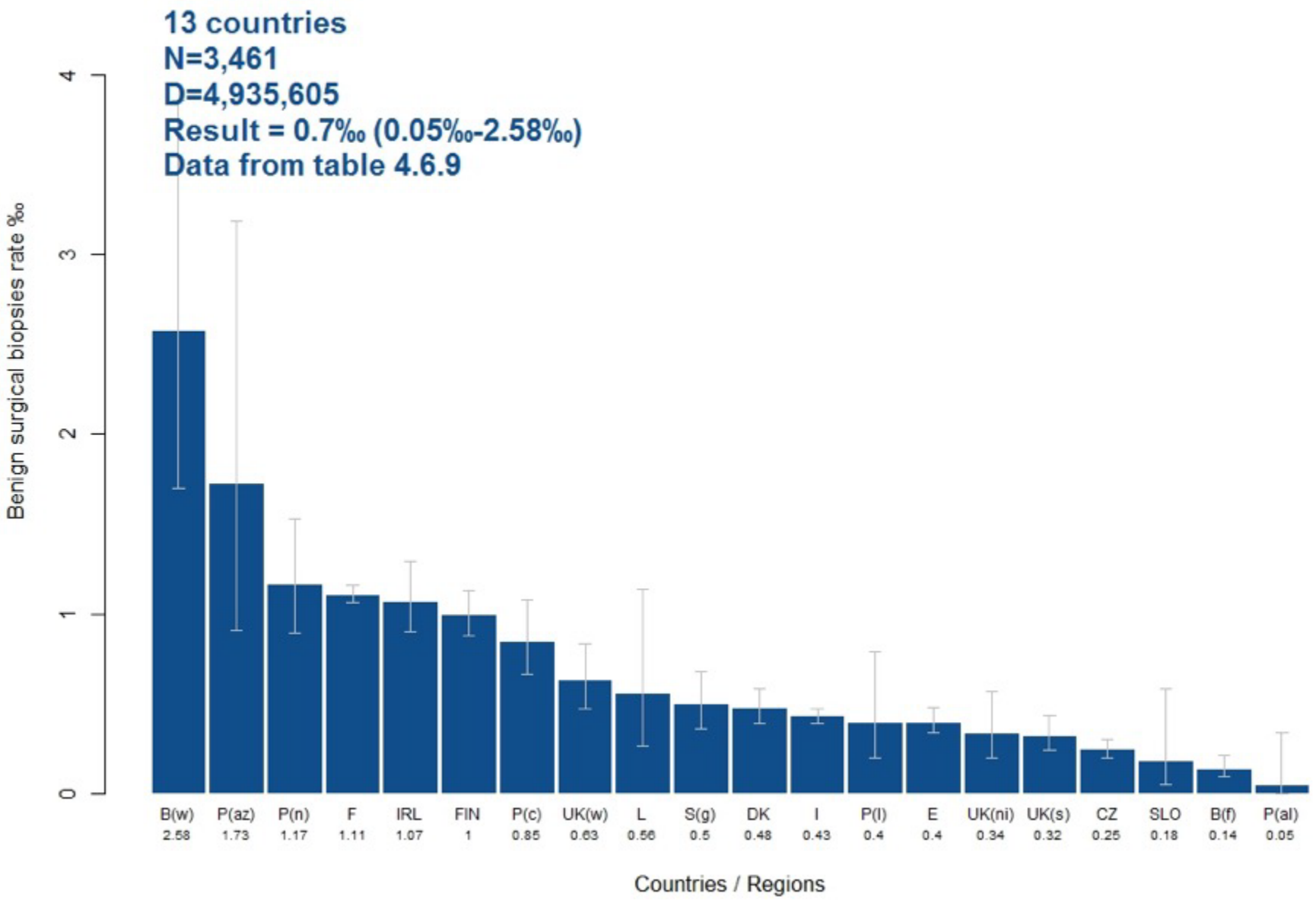
BREAST – Detection rate of invasive carcinoma (Women, 50-69 years)



BREAST – Positive predictive value of further assessment for in situ and invasive carcinoma (Women, 50-69 years)



BREAST – Benign surgical biopsies rate (Women, 50-69 years, subsequent tests)



Performance measures in the EU vs. US

	EU 15,531,953 tests (2013-2014, age 50-69) prevalently biennial screening with double reading.	USA 1,682,504 tests (2007-2013, all ages), prevalently annual single-read screening.
Further assessment	5.2%	11.6%
Invasive cancer detection rate	5.2 per 1000	3.5 per 1000
DCIS detection rate	1.0 per 1000	1.6 per 1000
% of DCIS of all cancers	16.3%	31.0%
PPV of further assessment	12.2%	4.4%
Number of recalls needed to detect one cancer	8	23

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Lehman CD et al, Radiology. 2017;283(1):49-58.

European Commission. Cancer Screening in the European Union, 2017.

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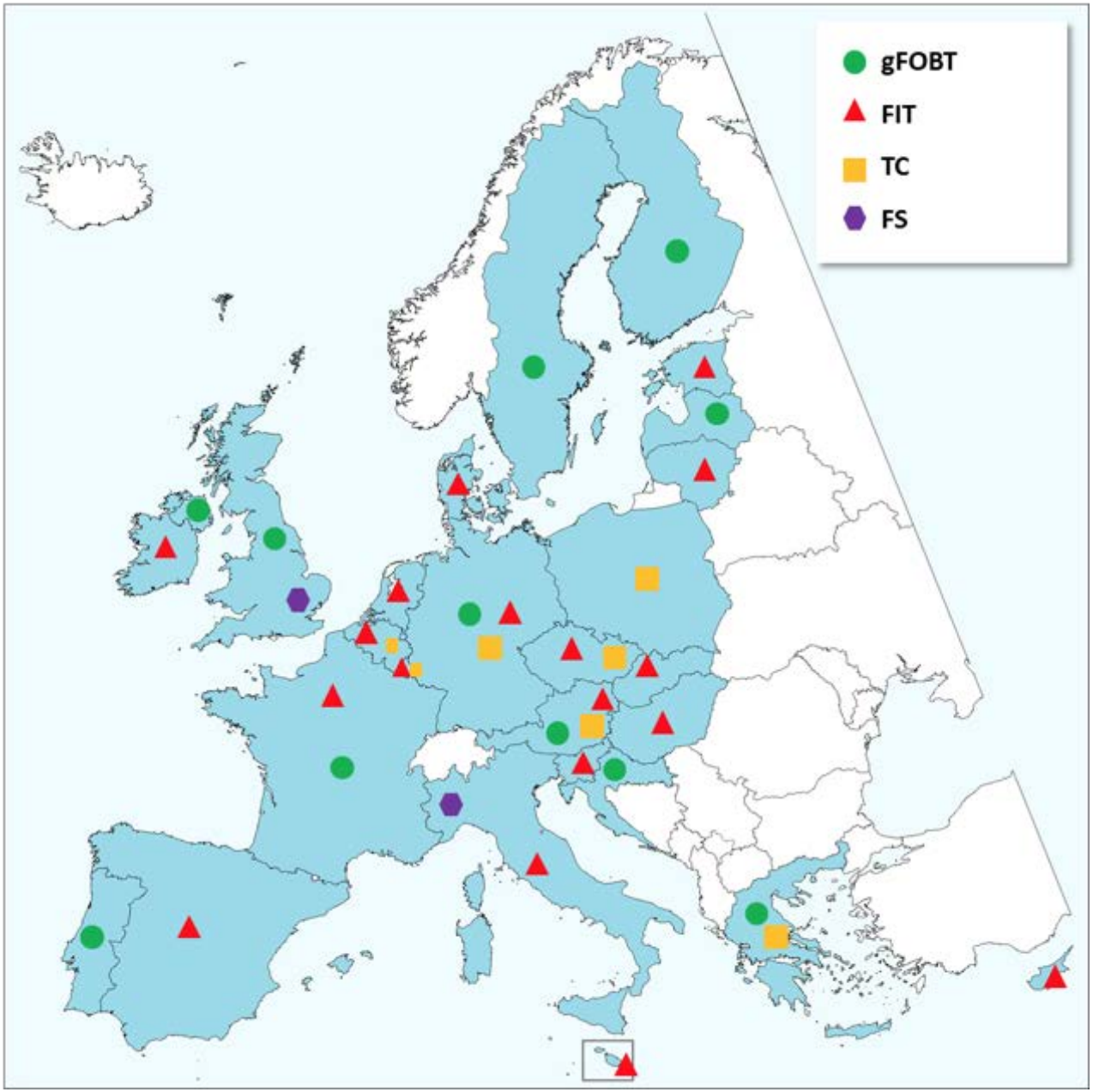
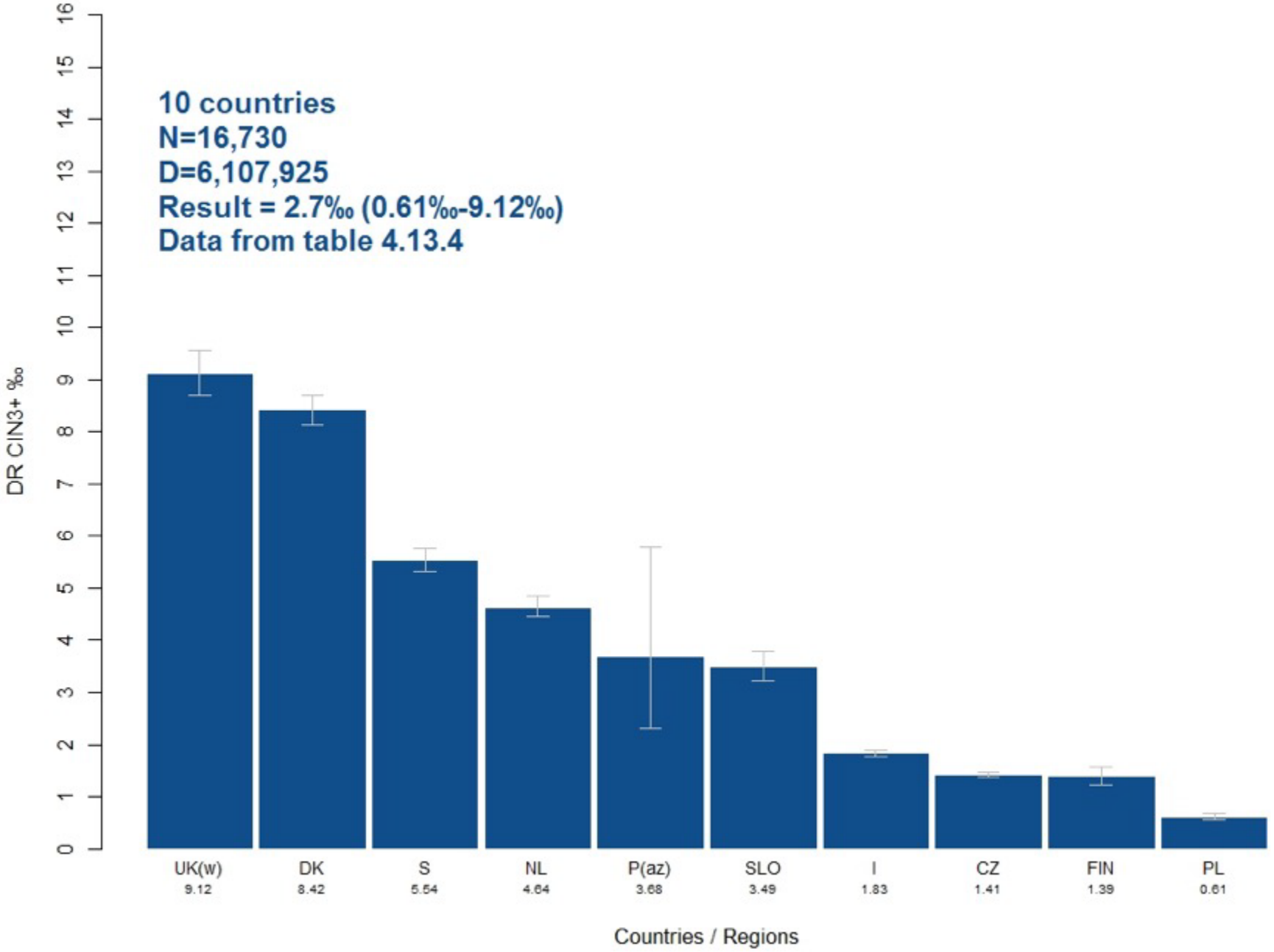
Tests Used for CRC Screening In the EU Member States



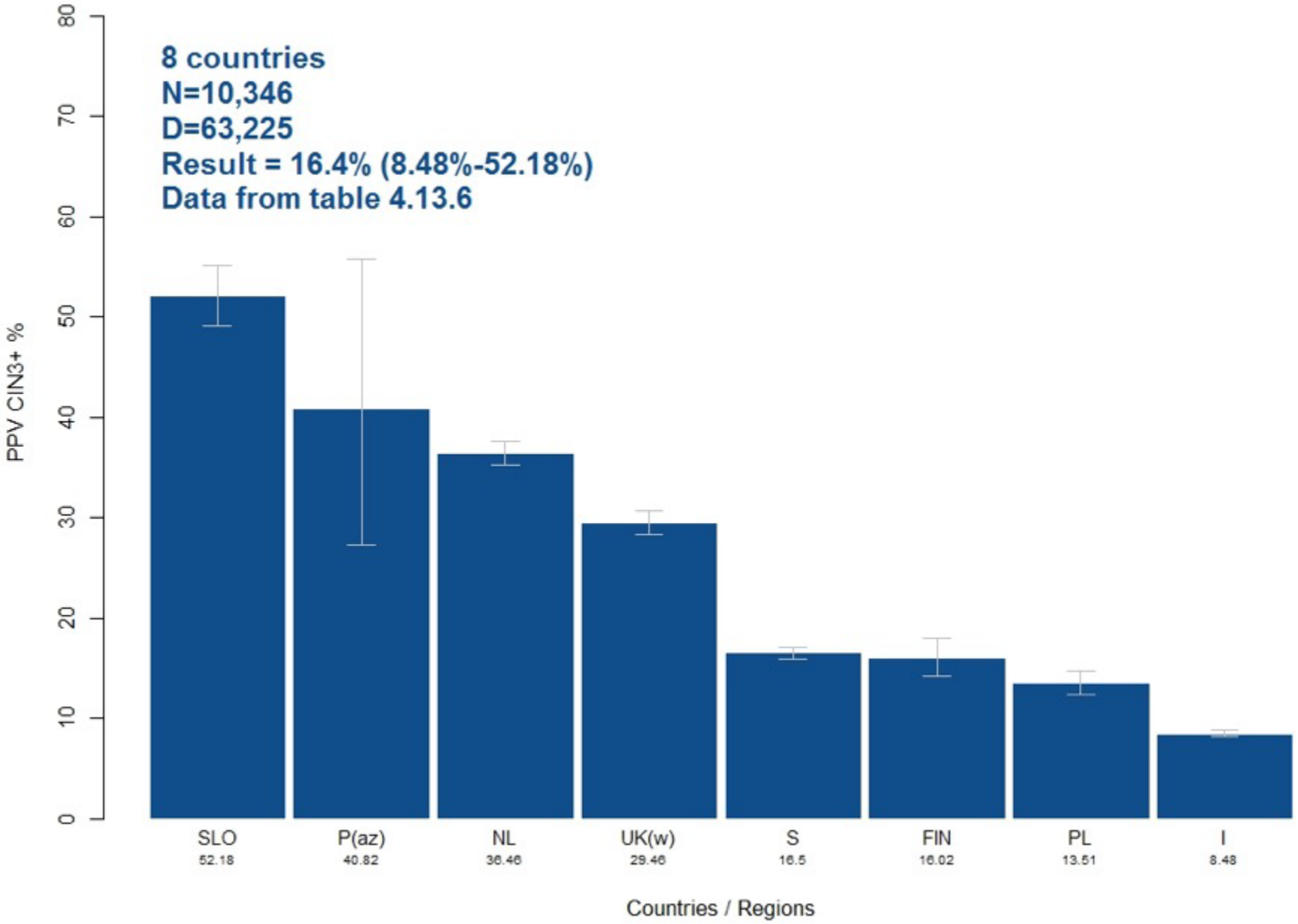
COLON – Participation rate (Men + Women, 60-69 years, crude)

	50-59			60-69		
	FIT	gFOBT	TC/FS	FIT	gFOBT	TC/FS
Tests	1,753,983	1,294,982	12,778	2,218,695	3,140,223	17,541
Screen positivity	5,1%	2,0%	11,5%	6,5%	2,1%	-
F.U. colonoscopy participation rate	76,8%	83,1%	82,2%	75,0%	84,5%	-
Completion rate F.U. colonoscopy	93,9%	97,8%	97,2%	93,7%	96,8%	97,1%
Detection Rate advanced adenoma	8,7‰	2,5‰	49,5‰	13,7‰	2,3‰	72,4‰
Detection Rate colorectal cancers	1,1‰	0,6‰	3,5‰	2,3‰	1,2‰	8,1‰

CERVIX – Detection rate of CIN3+ (Women, all reported ages)



CERVIX – Positive predictive value of CIN3+ (Women, all reported ages)



Linkage Between Cancer Registry and Screening Database

- Key to assess the impact of screening over time
- Helps detect the ‘interval cancers’
- Performance indicators (detection rates, PPV, CIS/Inv cancer) can be estimated
- The proportion of cancers being detected through ‘opportunistic’ programs can be estimated

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CANCER SCREENING IN FIVE CONTINENTS

CANSCREEN5

KEY PROJECT GOALS

Collect and disseminate information on cancer screening practices and programmes globally

Harmonize data collection for the evaluation of screening programmes

Assist countries in organizing their health information systems for continuous quality improvement of screening programmes

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CANSCREEN5

ABOUT | DATA & METHODS | COUNTRY PROFILE | ANALYSIS TOOLS | FUNDERS | DATA PROVIDERS | HELP

GRAPHIC | TABLE | MAP

Continents: Europe

Focus on: Countries

Cancer sites: Breast

Indicator: National screening policy

Protocol: All

Age Groups: All reported ages

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Breast Cancer Screening, National screening policy

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data source: EUSR 2016
Map production: IARC
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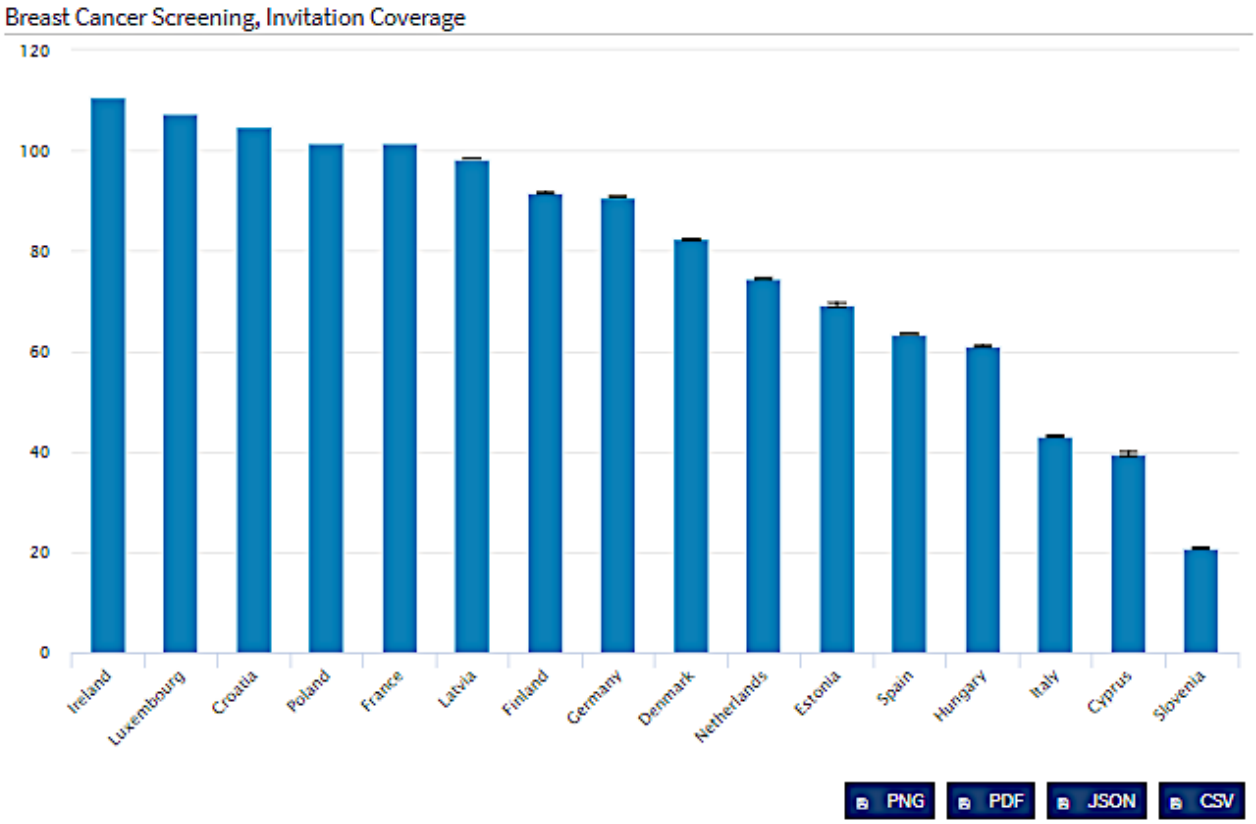

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Take Home Message

- An effective health information system is essential to implement/monitor cancer screening
- Collecting good quality data allows estimation of core performance indicators
- Comparison of performance indicators against pre-determined standards is necessary
- CanScreen5 has developed standardized definitions and tools to harmonize data collection from different countries